

## **Navajo County Drainage Policy**

### **Section 3.15.1 – General**

A. Intent: The policies and guidelines contained in this policy are intended to provide drainage design information and guidance for prospective developers, engineers and builders who plan to develop or construct projects in Navajo County. All designers should familiarize themselves with Navajo County Subdivision Regulations, Navajo County Flood Damage Prevention Ordinance, and any other applicable code or ordinances before undertaking projects within Navajo County. In case of conflicts between any code and ordinance, the more restrictive shall apply.

B. Requirements for Storm Drainage Facilities: All developments within Navajo County shall provide such storm drainage facilities as are necessary to insure that all improvements, structures and properties, both within the subject development and those located up and downstream of the development, shall be protected from the adverse impact of storm water due to the proposed development. The storm drainage facilities shall be designed and constructed so as to insure that the post-development flow from the development site is not greater than the pre-development flow for the 2, 10, 50 and 100 year flood events.

A Drainage Plan and a Drainage Report shall be required from any development or construction project which is proposed within Navajo County. See the Navajo County Subdivision regulations for other reports and documentation which is to be provided when a Tentative Plat is submitted.

A Storm Water Pollution Prevention Plan (SWPPP) shall be required of any development / construction project, greater than one acre or as required to be in compliance with ADEQ and EPA regulations. A copy of the Notice of Intent (NOI) filed with ADEQ shall be provided to Navajo County, prior to any construction.

Any development or project which infringes on the "Waters of the United States", as defined by the Section 404 of the Clean Water Act, or a defined floodplain, as defined by the US Federal Emergency Management Agency, or ADWR shall prepare and submit the necessary permit applications to the respective federal or state agencies, and provide evidence of acquisition of the permits to Navajo County.

The use of surface detention basins for reduction of off-site storm water flows is discouraged, unless no other method of runoff attenuation is possible.

C. Reports: A Preliminary Drainage Report shall be submitted at the time of Tentative Plat review. The report shall be prepared and sealed by a Registered Professional Engineer licensed to practice in the State of Arizona. The Preliminary Drainage Report shall include, as a minimum, the following information:

1. A description of how the proposed development will comply with Navajo County Drainage Policy.
2. A description of any existing drainage conveyances, such as natural water courses, floodplains, and drainage from adjacent lands.
3. Tentative description of proposed new conveyances, detention facilities, their size, and location.
4. The effects of the proposed development, and any proposed detention facilities, on any

adjacent property, either up or downstream. Detailed hydrologic and hydraulic analyses are not required with the Preliminary Report; however, the information provided must be adequate to demonstrate compliance with the applicable regulations.

5. A discussion of potential soils erosion or sedimentation which may occur as a result of this project.

1. The Final report shall contain, as a minimum:

- a. Cover
- b. Title of Report
- c. Date of Report completion or Submittal, and any revisions.
- d. Project name and location
- e. Name and address of the Client.
- f. Name, address and phone number of the Engineering firm submitting the report.
- g. Seal and signature of the Arizona Registered Professional Engineer who prepared the report.

2. Table of Contents:

3. Introduction:

- i. Location map showing the property and the adjacent properties, streets and nearby watercourses.
- ii. Legal description of the subject property.
- iii. Description of the subject property and proposed land use, existing drainage patterns, natural water courses, drainage problems or issues, and floodplain status within the development.
- iv. Description of the potential impacts of the project, both upstream and downstream.

4. Objectives and Procedures:

5. Summary of the purpose of the report:

- a. Description of methodologies, assumptions, and procedures used in preparing the report.
- b. General description of the project, including water courses and channels, detention basins and principal features of the flood control and drainage.
- c. Description of all applicable development standards, policies, detention requirements and floodplain regulations to which the proposed development must adhere.

6. Hydrology:

- a. The hydrologic calculations and data shall use as their basis the State Standard Hydrologic Modeling Guideline (SS) 10-07, and as referenced, the ADOT Highway Drainage Design Manual, Hydrology, dated March 1993.
- b. The Rational method may be used to calculate runoff for areas less than 160 acres. The US Corps of Engineers HEC-1 modeling, or other accepted models for rainfall-runoff, may be used for larger areas. The ADOT Highway Drainage Design Manual shall be used as the guidance when utilizing the Rational Method and the State Standard (SS) 10-07 Hydrologic Modeling Guideline, and shall be used when utilizing the HEC-1 Flood Hydrograph Package.
- c. Flood frequency analyses shall be performed for 2, 10, 50 and 100 year events, shall be based on Watershed Time of Concentration and shall comply with SS 10-07.
- d. Scalable drainage maps shall be provided for pre and post-development conditions, which will clearly depict contributing watersheds, sub-basins, concentration points, flow patterns,

measured flow lengths and topography. The topography shall include appropriate datum references and contour intervals of 2 feet or less. Hydrologic data sheets shall be included.

e. NOAA Atlas 14 shall be used to determine Point Rainfall Depth

7. Hydraulics:

a. All channels and culverts within the project shall have design and capacity computations included, in accordance with this policy.

b. Design computations for all storm drains, inlets, street sections and detention facilities shall be provided. Storm drain design shall include a labeled schematic for the storm drain network, design discharges, pipe capacities, profiles, velocities and hydraulic grade line.

c. Adequate analysis of soils on the site to demonstrate that the project design will not generate soils erosion problems or downstream sedimentation.

d. Effect of the proposed project on drainage conveyances.

e. All supporting documentation shall be included in the report.

f. The hydraulic calculations shall, as a minimum, meet the State Standard Floodplain Hydraulic Modeling SS-9-02 and the State Standard for Floodplain and Floodway Delineation in Riverine Environments SS-2-96 and the requirements of this policy.

g. Existing or new Floodplains and floodways shall be delineated on the development site plan.

8. Detention Basin Design:

a. A site plan, to scale, shall be provided which clearly shows dimensions and locations of all proposed detention basin(s) including the location, size and type of inflow and outflow structures.

b. Provision of on-site detention of 100-year, two-hour event volume, or a detailed detention routing analysis demonstrating that the proposed detention facilities have sufficient storage capacity and effectively attenuate peak discharge rates.

c. If in a common area, show the boundaries of the area, and any easements which are to be provided.

d. Description of recreation facilities and landscaping on or in the basin.

e. Inflow and Outflow basin hydrographs for all four event periods. The post-development outflows may not exceed pre-development outflows for any event period.

f. If any retaining walls are utilized, include free-body diagrams to indicate all forces, moments and computations for determining factors of safety against sliding and overturning.

g. Avoid use of streets or parking lots for storm water conveyance or storage.

h. All basins shall completely drain in no more that 36 hours.

i. No streets or parking areas may be used for detention purposes.

j. All basins shall have side slopes no steeper than 3 to 1, and depths should not exceed three feet.

k. The storm basin design shall, as a minimum, meet the State Standard SS-10 - 07 Hydrologic Modeling Guidelines and SS 8-99 Stormwater Detention / Retention, and the requirements of this policy.

9. Summary and Conclusions:

a. A brief summary of the analyses and conclusions shall be presented in the report.

b. A brief description of how the proposed development and / or the public improvements will adhere to these Regulations and the Navajo County floodplain regulations, and mitigate any impacts created by the development.

c. References and appendices may be used to list or present relevant information.

10. Floodplain Studies and map Revisions:

Detailed floodplain studies are required for areas that have not been studied and may be defined as floodplains per the Navajo County Flood Damage Prevention Ordinance and / or ADWR requirements where the watershed is greater than 160 Acres or the stream flow is greater than 500 CFS. The floodplain studies shall be prepared and submitted to FEMA, utilizing FEMA requirements for floodplain studies. The submittals shall include:

- Conditional Letter of Map Revision (CLOMR)
- Letter of map Revision (LOMR), and
- Physical Map Revision (PMR)

Floodplain studies may also be required by Navajo County Engineer or Navajo County Flood Control Director, for a Conditional Letter of Map Amendment (CLOMA) or a Conditional Letter of Map Revision on Fill (COLMR-F).